E-MAIL SPAM CLASSIFIER

STEP 1: Importing Necessary Libraries

In [5]:

```
import numpy as np  #for numerical operations
import pandas as pd #for data manipulation & handling
from sklearn.model_selection import train_test_split #for various machine lear
from sklearn.feature_extraction.text import TfidfVectorizer #for the feature e
from sklearn.linear_model import LogisticRegression #popular classification al
from sklearn.metrics import accuracy_score #for the evaluation of the model pe
```

STEP 2: Importing the Dataset

In [8]:

```
df = pd.read_csv(r"D:\LATEST\Projects\Python_ML\mail_data.csv")
```

In [10]:

```
print(df)
```

```
     Category                                            Message
0         ham  Go until jurong point, crazy.. Available only ...
1         ham                      Ok lar... Joking wif u oni...
2        spam  Free entry in 2 a wkly comp to win FA Cup fina...
3         ham  U dun say so early hor... U c already then say...
4         ham  Nah I don't think he goes to usf, he lives aro...
...       ...                                                ...
5567     spam  This is the 2nd time we have tried 2 contact u...
5568      ham               Will ü b going to esplanade fr home?
5569      ham  Pity, * was in mood for that. So...any other s...
5570      ham  The guy did some bitching but I acted like i'd...
5571      ham                         Rofl. Its true to its name

[5572 rows x 2 columns]
```

DATA PREPROCESSING

In [12]:

```
data = df.where((pd.notnull(df)), '')
```

DATA VIEWING

In [14]:

```
data.head()
```

Out[14]:

	Category	Message
0	ham	Go until jurong point, crazy.. Available only ...
1	ham	Ok lar... Joking wif u oni...
2	spam	Free entry in 2 a wkly comp to win FA Cup fina...
3	ham	U dun say so early hor... U c already then say...
4	ham	Nah I don't think he goes to usf, he lives aro...

```
In [16]: data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5572 entries, 0 to 5571
Data columns (total 2 columns):
 #   Column    Non-Null Count  Dtype 
---  ------    --------------  ----- 
 0   Category  5572 non-null   object
 1   Message   5572 non-null   object
dtypes: object(2)
memory usage: 87.2+ KB
```

```
In [20]: data.shape
```

```
Out[20]: (5572, 2)
```

LABEL ENCODING

```
In [22]: data.loc[data['Category'] == 'spam', 'Category',] = 0
         data.loc[data['Category'] == 'ham', 'Category',] = 1
```

```
In [24]: X = data['Message']
         Y = data['Category']
```

```
In [26]: print(X)
```

```
0       Go until jurong point, crazy.. Available only ...
1                           Ok lar... Joking wif u oni...
2       Free entry in 2 a wkly comp to win FA Cup fina...
3       U dun say so early hor... U c already then say...
4       Nah I don't think he goes to usf, he lives aro...
                              ...                        
5567    This is the 2nd time we have tried 2 contact u...
5568                 Will ü b going to esplanade fr home?
5569    Pity, * was in mood for that. So...any other s...
5570    The guy did some bitching but I acted like i'd...
5571                           Rofl. Its true to its name
Name: Message, Length: 5572, dtype: object
```

```
In [28]: print(Y)
```

```
0       1
1       1
2       0
3       1
4       1
       ..
5567    0
5568    1
5569    1
5570    1
5571    1
Name: Category, Length: 5572, dtype: object
```

DATASET SPLITTING

```
In [34]: X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, rando
```

```
In [36]: print(X.shape)
         print(X_train.shape)
         print(X_test.shape)
```

```
(5572,)
(4457,)
(1115,)
```

```
In [38]: print(Y.shape)
         print(Y_train.shape)
         print(Y_test.shape)
```

```
(5572,)
(4457,)
(1115,)
```

FEATURE EXTRACTION

```
In [42]: feature_extraction = TfidfVectorizer(min_df = 1, stop_words = 'english', lower

         X_train_features = feature_extraction.fit_transform(X_train)
         X_test_features = feature_extraction.transform(X_test)

         Y_train = Y_train.astype('int')
         Y_test = Y_test.astype('int')
```

```
In [44]: print(X_train)
```

```
3075                  Don know. I did't msg him recently.
1787    Do you know why god created gap between your f...
1614                         Thnx dude. u guys out 2nite?
4304                                      Yup i'm free...
3266    44 7732584351, Do you want a New Nokia 3510i c...
                              ...
789     5 Free Top Polyphonic Tones call 087018728737,...
968     What do u want when i come back?.a beautiful n...
1667    Guess who spent all last night phasing in and ...
3321    Eh sorry leh... I din c ur msg. Not sad alread...
1688    Free Top ringtone -sub to weekly ringtone-get ...
Name: Message, Length: 4457, dtype: object
```

```
In [46]: print(X_train_features)
```

```
(0, 2329)        0.38783870336935383
(0, 3811)        0.34780165336891333
(0, 2224)        0.413103377943378
(0, 4456)        0.4168658090846482
(0, 5413)        0.6198254967574347
(1, 3811)        0.17419952275504033
(1, 3046)        0.2503712792613518
(1, 1991)        0.33036995955537024
(1, 2956)        0.33036995955537024
(1, 2758)        0.3226407885943799
(1, 1839)        0.2784903590561455
(1, 918)        0.22871581159877646
(1, 2746)        0.3398297002864083
(1, 2957)        0.3398297002864083
(1, 3325)        0.31610586766078863
(1, 3185)        0.29694482957694585
(1, 4080)        0.18880584110891163
(2, 6601)        0.6056811524587518
(2, 2404)        0.45287711070606745
(2, 3156)        0.4107239318312698
(2, 407)        0.509272536051008
(3, 7414)        0.8100020912469564
(3, 2870)        0.5864269879324768
(4, 2870)        0.41872147309323743
(4, 487)        0.2899118421746198
:        :
(4454, 2855)        0.47210665083641806
(4454, 2246)        0.47210665083641806
(4455, 4456)        0.24920025316220423
(4455, 3922)        0.31287563163368587
(4455, 6916)        0.19636985317119715
(4455, 4715)        0.30714144758811196
(4455, 3872)        0.3108911491788658
(4455, 7113)        0.30536590342067704
(4455, 6091)        0.23103841516927642
(4455, 6810)        0.29731757715898277
(4455, 5646)        0.33545678464631296
(4455, 2469)        0.35441545511837946
(4455, 2247)        0.37052851863170466
(4456, 2870)        0.31523196273113385
(4456, 5778)        0.16243064490100795
(4456, 334)        0.2220077711654938
(4456, 6307)        0.2752760476857975
(4456, 6249)        0.17573831794959716
(4456, 7150)        0.3677554681447669
(4456, 7154)        0.24083218452280053
(4456, 6028)        0.21034888000987115
(4456, 5569)        0.4619395404299172
(4456, 6311)        0.30133182431707617
(4456, 647)        0.30133182431707617
(4456, 141)        0.292943737785358
```

MODEL SELECTION

In [48]:

```
Model = LogisticRegression()
```

In [50]:

```
Model.fit(X_train_features, Y_train)
```

Out[50]:

```
▾ LogisticRegression ⓘ ?

LogisticRegression()
```

MODEL TRAINING & ACCURACY TESTING

In [52]:

```
prediction_on_training_data = Model.predict(X_train_features)
accuracy_on_training_data = accuracy_score(Y_train, prediction_on_training_dat
```

In [54]:

```
print('Accuracy on training data: ', accuracy_on_training_data)
```

```
Accuracy on training data:  0.9676912721561588
```

In [56]:

```
prediction_on_testing_data = Model.predict(X_test_features)
accuracy_on_testing_data = accuracy_score(Y_test, prediction_on_testing_data)
```

In [58]:

```
print('Accuracy on testing data: ',accuracy_on_testing_data)
```

```
Accuracy on testing data:  0.9668161434977578
```

MODEL BUILDING & EVALUATION

In [64]:

```
input_your_email = ["This is the third time we have tried to contact you , you
input_data_features = feature_extraction.transform(input_your_email)
prediction = Model.predict(input_data_features)

print(prediction) #0 = spam & 1 = ham

if(prediction[0] == 1):
    print('Ham Mail')
else:
    print('Spam Mail')
```

```
[0]
Spam Mail
```

In [66]:

```
input_your_email = ["Well obviously not because all the people in my college l
input_data_features = feature_extraction.transform(input_your_email)
prediction = Model.predict(input_data_features)

print(prediction) #0 = spam & 1 = ham

if(prediction[0] == 1):
    print('Ham Mail')
else:
    print('Spam Mail')
```

```
[1]
Ham Mail
```